## WHAT IS CLAIMED IS:

1	1. An isolated origin of replication for F. nucleatum that comprises a
2	least two copies of an iteron, the iteron having a nucleic acid sequence of SEQ ID NO:3.
1	2. The isolated origin of replication of claim 1, wherein the isolated
2	origin of replication comprises two to six copies of the iteron.
1	3. The isolated nucleic acid of claim 1, wherein the isolated origin or
2	replication comprises a nucleic acid sequence of SEQ ID NO:4.
1	4. The isolated nucleic acid of claim 1, wherein the isolated origin of
2	replication comprises a nucleic acid sequence of nucleotide position 3936 to 4481 of
3	plasmid pFN1.
1	5. An isolated nucleic acid encoding a RepA protein for F. nucleatur
2	the nucleic acid:
3	(a) encoding a protein that has greater than about 80% amino acid
4	sequence identity to a polypeptide having a sequence of SEQ ID NO:1; or
5	(b) selectively binding to polyclonal antibodies generated against SEC
6	ID NO:1.
1	6. The isolated nucleic acid of claim 5, wherein the nucleic acid
2	encodes a polypeptide having a sequence of SEQ ID NO:1.
1	7. The isolated nucleic acid of claim 5, wherein the nucleic acid
2	encodes a polypeptide having a molecular weight of about 44.8 kDa.
1	8. The isolated nucleic acid of claim 5, wherein the nucleic acid is
2	from F. nucleatum.
1	9. The isolated nucleic acid of claim 5, wherein the nucleic acid has a
2	sequence of SEQ ID NO:2.
1	10. An isolated nucleic acid molecule comprising a 2.36 kb DNA
2	fragment generated by cleaving plasmid pFN1 with restriction endonucleases AvrII and
3	ScaII.

1		11.	An isolated nucleic acid molecule comprising a 0.9 kb DNA
2	fragment gen	erated b	by cleaving plasmid pFN2 with restriction endonucleases HincII and
3	HpaII.		
1		10	
1		12.	An isolated RepA protein for F. nucleatum, the RepA protein
2	having:		
3		(a)	greater than about 80% amino acid sequence identity to a
4	polypeptide h	aving a	sequence of SEQ ID NO:1; or
5		(b)	selectively binding to polyclonal antibodies generated against SEQ
6	ID NO:1.		·
1		13.	The isolated RepA protein of claim 12, wherein the polypeptide
2	has greater th		at 97% amino acid identity to a polypeptide having a sequence of
3	SEQ ID NO:1		a sequence of
,	5LQ 1D 110.1	•	
1		14.	The isolated RepA protein of claim 12, wherein the polypeptide
2	has the amino	acid se	equence of SEQ ID NO:1
1		1.5	
1		15. 	An isolated plasmid for replicating in <i>F. nucleatum</i> , the plasmid
2			of replication that comprises at least two copies of an iteron, the
3	iteron having	a nucle	ic acid sequence of SEQ ID NO:3.
1		16.	The plasmid of claim 15, wherein the origin of replication
2	comprises bet	ween tv	vo to six copies of the iteron.
	•		•
1		17.	The plasmid of claim 15, wherein the origin of replication
2	comprises a n	ucleic a	cid sequence of SEQ ID NO:4.
1		18.	The plasmid of claim 15, the plasmid further comprising a marker
2	cono	10.	The plasmid of claim 13, the plasmid further comprising a marker
2	gene.		
1		19.	The plasmid of claim 18, wherein the marker gene is an antibiotic
2	resistance gen	e.	
1		20.	The plasmid of claim 15, wherein the origin of replication is
2	recombinantly inserted into the plasmid.		

1		21.	An isolated plasmid for replicating in F. nucleatum, the plasmid
2	comprising a	nucleic	acid encoding a RepA protein for F. nucleatum, the nucleic acid:
3		(a)	encoding a protein that has greater than about 80% amino acid
4	sequence ider	ntity to	a polypeptide having a sequence of SEQ ID NO:1; or
5		(b)	selectively binding to polyclonal antibodies generated against SEQ
6	ID NO:1,		
7		provid	ded that the nucleic acid encoding the RepA protein has other than
8	the nucleic ac	id sequ	ence of SEQ ID NO:5.
1		22.	The plasmid of claim 21, wherein the nucleic acid encodes a
2	polypeptide having a sequence of SEQ ID NO:1.		
1 /		23.	The plasmid of claim 21, wherein the nucleic acid has a sequence
2	of SEQ ID N	O:2.	
1		24.	The plasmid of claim 21, the plasmid further comprising a marker
2	gene.		
1		25.	The plasmid of claim 24, wherein the marker gene is an antibiotic
2	resistance ger	ne.	
1		26.	The plasmid of claim 20, wherein the nucleic acid encoding a
2	RepA protein	is reco	mbinantly inserted into the plasmid.
1		27.	The plasmid of claim 15, the plasmid further comprising a nucleic
2	acid encoding	g a Rep	A protein for F. nucleatum, the nucleic acid:
3		(a)	encoding a protein that has greater than about 80% amino acid
4			sequence identity to a polypeptide having a sequence of SEQ ID
5			NO:1; or
6		(b)	selectively binding to polyclonal antibodies generated against SEQ
7			ID NO:1,
8		provi	ded that the nucleic acid encoding the RepA protein has other than
9	the nucleic ac	cid sequ	nence of SEQ ID NO:5.
1		28.	The plasmid of claim 27, wherein the nucleic acid encodes a
2	malumantida l	anzina (	requence of SEO ID NO:1

2	of SEQ ID NO	29. D:2.	The plasmid of claim 27, wherein the nucleic acid has a sequence
1 2	one marker ge	30. ne.	The plasmid of claim 27, the plasmid further comprising at least
1 2	resistance gen	31. e.	The plasmid of claim 30, wherein the marker gene is an antibiotic
1 2	transcription c	32.	The plasmid of claim 27, the plasmid further comprising a comprising a nucleic acid of interest operably linked to a promoter.
1 2 ′	comprising:	33.	An isolated plasmid for replicating in F. nucleatum, the plasmid
3	plasmid pFN1	(a) ;	a nucleic acid sequence of nucleotide position 3936 to 4481 of
5 6	restriction end	(b) onuclea	a 2.36 kb DNA fragment generated by cleaving plasmid pFN1 with ases <i>AvrII</i> and <i>ScaII</i> ; or
7 8	restriction end	(c) onuclea	a 0.9 kb DNA fragment generated by cleaving plasmid pFN2 with ases HincII and HpaII.
1 2	Accession No.	34. AF159	An isolated plasmid designated pFN1 that has a GenBank 9249.
1 2	maps as shown	35. n in Fig	An isolated plasmid designated pFN2 that have partial restriction are 1A, 3 and 5.
1 2	map as shown	36. in Figu	An isolated plasmid designated pFN3 that has a partial restriction are 1A.
1 2 3			A shuttle vector comprising an origin of replication functional in <i>E</i> . replication functional in <i>F</i> . nucleatum, wherein the origin of in <i>F</i> . nucleatum comprises at least two copies of an iteron having a
4	nucleic acid se	•	of SEQ ID NO:3.
1		38.	The shuttle vector of claim 37, wherein the origin of replication

functional in F. nucleatum comprises between two to six copies of the iteron.

1		39.	The shuttle vector of claim 37, wherein the origin of replication
2	functional in I	F. nucle	eatum comprises a nucleic acid sequence of SEQ ID NO:4.
1		40.	The shuttle vector of claim 27 wherein the animis of a 1' at
2	functional in A		The shuttle vector of claim 37, wherein the origin of replication eatum comprises a nucleic acid sequence of nucleotide position 3936
3	to 4481 of plas		_
J	10 4401 01 pla	simu p.	TINI.
1		41.	The shuttle vector of claim 37, the vector further comprising a
2	nucleic acid en	ncoding	g a RepA protein for F. nucleatum, the nucleic acid:
3		(a)	encoding a protein that has greater than about 80% amino acid
4	sequence iden	tity to a	a polypeptide having a sequence of SEQ ID NO:1; or
5		(b)	selectively binding to polyclonal antibodies generated against SEQ
6 /	ID NO:1.		
1		42.	The chartle waster of all 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
2	the Don A must		The shuttle vector of claim 41, wherein the nucleic acid encoding
4	me KepA prou	em for	F. nucleatum encodes a polypeptide having a SEQ ID NO:1.
1		43.	The shuttle vector of claim 41, wherein the nucleic acid encoding
2	the RepA prote	ein for	F. nucleatum has a sequence of SEQ ID NO:2.
1		44.	The shuttle vector of claim 41, the vector further comprising at
2	least one mark	er gene	<del>)</del> .
1		45.	The shuttle vector of claim 44, wherein the marker gene is an
2	antibiotic resis	tance g	
		_	
1		46.	The shuttle vector of claim 41, wherein the vector comprises an
2	ermF-ermAM	cassette	e.
1		47.	The shuttle vector of claim 41, the vector further comprising a
2			comprising a nucleic acid of interest operably linked to a promoter.
		2000110	comprising a naciona acid of interest operably linked to a promoter.
1		48.	A shuttle vector designated pHS17 that has a partial restriction map
2	as shown in Fig	gure 1 <i>A</i>	Λ.
1		40	A heat call commission the alexandary of the second
1		49.	A host cell comprising the plasmid of claim 18.
1		50.	The host cell of claim 49, wherein the host cell is $F$ . nucleatum.